Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GREGORY KOZLOWSKI and CHARLES E. OBERLY

Appeal No. 1999-2595
Application No. 08/927,106

ON BRIEF

Before OWENS, WALTZ, and KRATZ, Administrative Patent Judges.
WALTZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the examiner's refusal to allow claims 1, 3 through 6, 19, 21 and 22 as amended subsequent to the final rejection (see the amendment dated Aug. 3, 1998, Paper No. 17, entered as per the Advisory Action dated Aug. 6, 1998, Paper No. 18). Claims 1, 3-6, 19, 21 and 22 are the only claims pending in this application. We have jurisdiction pursuant to 35 U.S.C. § 134.

According to appellants, the invention is directed to a neodymium gallate (NGO) surface layer on a nickel sheath which acts

as a diffusion barrier to prevent diffusion of nickel into the yttrium-based copper oxide (YBCO) superconductor during subsequent high temperature melt-processing (Brief, page 2). A copy of illustrative independent claim 1 is attached as an Appendix to this decision.

The examiner has relied upon the following references as evidence of obviousness:

Woolf et al. (Woolf '389)	5,047,389	Sep. 10, 1991
Woolf et al. (Woolf '360)	5,164,360	Nov. 17, 1992

Ozaki et al. (Ozaki), "Preparation of Superconducting Y-Ba-Cu-O Thin Films on Metallic Substrates," *Proc. of the Conference on the Science and Technology of Thin Film Superconductors*, pp. 363-370 (1989).

Boikov et al. (Boikov), "Epitaxial growth and properties of $YBa_2Cu_3O_{7-\delta}/NdGaO_3/YBa_2Cu_3O_{7-\delta}$ trilayer structures," *Appl. Phys. Lett.*, 59(20), pp. 2606-2608 (1991).

Han et al. (Han), "Metalorganic chemical vapor deposition route to epitaxial neodymium gallate thin films," *Appl. Phys. Lett.*, 61(25), pp. 3047-3049 (1992).

Claims 1, 19, 21 and 22 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ozaki in view of Woolf '389 and Boikov, further in view of Han (Answer, page 3).[1] Claims 3-6 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the

[1]The examiner has incorrectly stated the Boikov reference as "Boivok et al." on page 3 of the Answer, but correctly listed this reference on page 4 of the Answer. Accordingly, this error is deemed harmless.

references applied against claims 1, 19, 21 and 22 above, further in view of Woolf '360 (Answer, page 6).[2] We *reverse* all of the examiner's rejections for the reasons stated in the Brief and the reasons set forth below.

OPINION

A. Background

We note that this application is related to S.N. 08/278,626, which was the subject of an appeal (Appeal No. 97-0355), with a decision from a merits panel of this Board affirming the examiner's rejections of the claims (Paper No. 30, dated Mar. 13, 1998). The subject matter claimed in this related appeal was a method of making a substrate for a ceramic superconductor, with claim 7, part (c), reciting "sintering the layer of neodymium gallate over the nickel substrate at temperatures above about 1100°C." The pertinent subject matter claimed in this appeal is to the ceramic superconductor product, where the NGO has been presintered on the nickel substrate "at temperatures sufficient for nickel from the nickel substrate to diffuse into the neodymium gallate" (see claim 1, part (c)). The references applied against the claims in this

[2]We note that the final rejection of claims 21-22 under 35 U.S.C. § 112, ¶2, has been overcome by appellants' amendment subsequent to the final rejection (see the Advisory Action dated Aug. 6, 1998, Paper No. 18).

related appeal were different than those applied in this appeal.[3] Accordingly, the claims and references in this appeal are different than related Appeal No. 97-0355. *See In re Rinehart,* 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

B. The Rejections

The examiner finds that Ozaki does not disclose or suggest three features (Answer, page 4). The dispositive issue is whether Han teaches the third feature, i.e., presintering the NGO on the nickel substrate at temperatures sufficient for nickel from the substrate to diffuse into the NGO (see claim 1, part (c); the Brief, pages 6-8; and the Answer, pages 5-7).[4]

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[3]Uchigawa et al., Japanese Kokai patent application 4-152319, published May 26, 1992, was applied by the examiner in related Appeal No. 97-0355, while the Woolf '360 and '389 patents applied in this appeal were not applied in Appeal No. 97-0355.

[4]We note that the first difference is listed as "a nickel substrate" by the examiner (Answer, page 4). The examiner applies Woolf '389 as evidence that nickel has been used as a substrate for depositing a YBCO superconductor layer through an intermediate layer (*id.*). However, Woolf '389 is similar to Ozaki and only discloses and suggests nickel *alloy* substrates (see col. 4, ll. 29-47, and Table 1). The claims of Woolf '389 (col. 8, ll. 47-53) recite nickel but only in combination with the other elements (e.g., chromium and silicon, see claim 14). We also note that Woolf '360, applied only against claims 3-6, discloses the use of nickel alloy substrates but teaches that nickel has been previously used as a substrate, although it is not desirable for some applications (col. 1, ll. 58-61; col. 2,
(continued...)

The examiner finds that Han teaches applying an amorphous NGO precursor film over a $LaAlO_3$ substrate with subsequent annealing of the film at temperatures ranging from 750 to 1000°C. in an oxygen atmosphere for 6-12 hours to form a crystalline NGO film (Answer, page 5). Since appellants' specification discloses that nickel from the substrate diffuses into the NGO at temperatures from about 1000 to about 1300°C., the examiner concludes that at the sintering temperature of 1000°C. for a sufficient time as taught by Han, there would have been an interlayer of NGO diffused with nickel in the structure of Ozaki, Woolf '389, and Boikov (*id.*). We disagree.

As correctly argued by appellants (Brief, pages 6-7), Han teaches that NGO films on a $LaAlO_3$ substrate show "atomically abrupt interfaces" (Han, page 3048, right column, first full paragraph). Accordingly, Han does not teach or suggest any diffusion at any sintering temperature when using the $LaAlO_3$ substrate. Therefore, assuming arguendo that it would have been obvious to sinter a NGO film on a nickel substrate rather than the $LaAlO_3$ of Han, one of ordinary skill in the art would not be directed to sintering temperatures which cause diffusion of the substrate into the NGO film. Thus, even though appellants disclose

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[4](...continued)
ll. 45-60).

that a sintering temperature of about 1000°C. causes some diffusion of nickel into the NGO film (specification, page 9, ll. 23-25), one of ordinary skill in this art would not have been led to use a sintering temperature of 1000°C. for a sufficient duration to promote diffusion in view of the teaching of Han that "phase-pure" NGO films are desired, with atomically abrupt interfaces between the substrate and the film (see Han, page 3048, left column, first full paragraph, and right column, first full paragraph).

For the foregoing reasons, we determine that the combination of references as proposed by the examiner does not disclose or suggest all of the limitations of the claimed subject matter on appeal. Therefore we determine that the examiner has not established a *prima facie* case of obviousness. As noted above, the citation of Woolf '360 does not remedy the deficiencies discussed above. Accordingly, we cannot sustain the examiner's rejections on appeal.

The decision of the examiner is reversed.

REVERSED

TERRY J. OWENS Administrative Patent Judge	)	
THOMAS A. WALTZ Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
PETER F. KRATZ Administrative Patent Judge	)	

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APPENDIX

1. A ceramic superconductor, comprising:

(a) a nickel substrate;

(b) a yttrium-based copper oxide superconductor; and,

(c) between the nickel substrate and the yttrium-based copper oxide superconductor, a diffusion barrier made of neodymium gallate, wherein the neodymium gallate has been presintered on the nickel substrate at temperatures sufficient for nickel from the nickel substrate to diffuse into the neodymium gallate.